

# 2014 Indiana Mobile Acoustic Bat Survey Program



Timothy A. Shier, Cassie M. Hudson, and Scott A. Johnson

Indiana Department of Natural Resources

5596 East State Road 46

Bloomington, IN 47401

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## SUMMARY

- In 2014, 279 surveys in 76 counties provided complete acoustic data on summer resident bat populations in Indiana. A total of 704 surveys were completed from 2012 to 2014.
- Acoustic data from 2012 to 2014 were analyzed using AnalookW and Kaleidoscope Pro automated bat call identification software.
- The mean number of bat calls per hour of surveying decreased from 30.7 in 2012 to 21.6 in 2013 to 16.4 in 2014 (excluding data from counties not surveyed all three years).
- Of the 57 counties surveyed annually from 2012 to 2014, only Adams County did not experience a net decline in the mean number of bats per hour of surveying.
- Calls identified as *Myotis* spp. and tri-colored bats decreased in most natural regions. Calls identified as hoary bats increased in all natural regions.

## INTRODUCTION

Twelve of the 13 bat species identified from Indiana are listed as endangered or special concern by the Indiana Department of Natural Resources (IDNR). Indiana's Mobile Acoustic Bat Survey Program monitors trends in species abundance and location to aid conservation efforts, increase public awareness, assist in research, and identify matters of concern. With serious threats to bats from white-nose syndrome (WNS), wind farm development, and habitat loss, and given the biologic, economic, and intrinsic value of bats, it is prudent to monitor Indiana's summer resident bat populations.

The IDNR conducted pilot mobile acoustic surveys in summer 2011 and has since completed statewide surveying each of the following summers. This report summarizes the results of all completed surveys from 2012 to 2014.

## METHODS

Acoustic data were collected using an Anabat SD2 bat detector (sensitivity set to 6) connected to an Anabat Car Mount extension cable and "Hi" Microphone attached to the roof of a vehicle (Titley Scientific, Columbia, MO). GPS coordinates for each acoustic file were obtained using a

USB GPS Receiver BU-353-S4 (GlobalSat, New Taipei City, Taiwan). Surveys were conducted by driving pre-determined routes between 25 and 29 miles in length. Each route was surveyed two to four times between May 27 and July 7. Surveys began approximately 20 minutes after local sunset time and were driven at 15 to 18 mph.

Collected data were first filtered in AnalookW v.3.9f to remove acoustic files not containing bat calls. The filter was designed to minimize false positives, thereby resulting in a low value for the total number of bats detected. A manual examination of the files identified as bat calls indicated that >99% of these were correctly classified. The acoustic files classified as bat calls were then analyzed using Kaleidoscope Pro v.2.2.2 automated identification software (using the Indiana species list and set to "Sensitive/Accurate" identification).

The duration of each survey was used to standardize the data by bat calls detected per hour of surveying, thereby accounting for variations in route length and driving speed. Because *Myotis* species, eastern red and evening bats, and big brown and silver-haired bats are difficult to differentiate acoustically, results for these species have been reported in those respective groupings.

## RESULTS

A record 279 surveys were completed in 2014, up from 240 in 2013 and 185 in 2012 (Figure 1). This is largely due to an increase in the number of counties surveyed, but new equipment employed in 2014 also resulted in fewer surveys returning incomplete data due to technical problems. To illustrate, there was a mean of 3.67 completed surveys per county in 2014, compared to 3.24 in 2013 and 3.25 in 2012.

*Myotis* spp. decreased in six of seven natural regions, with declines approaching 50% in four of those regions. The range of the tri-colored bat generally only includes the four southern-most natural regions, but in those regions it experienced declines similar to *Myotis* spp. Conversely, hoary bats increased in all natural regions, while other species yielded mixed results (Figure 2).

The mean number of bat calls per hour of surveying has decreased across all seven natural regions the past two years, although the decline from 2013 to 2014 appears somewhat less severe than 2012 to 2013 (Figure 3). The trend of more bats detected during surveys occurring later in the summer has remained relatively constant all three years, likely due to newly volant young (Figure 4).

Hoary bats, the big brown/silver-haired group, and the eastern red/evening group comprise the vast majority of bats in the northern third of the state. Moving south, hoary bats and the big brown/silver-haired group become less prominent, while the proportion of the eastern red/evening group continues to increase. In the southern third of the state, tri-colored bats and *Myotis* spp. become

more prominent than in the central and northern regions, while the eastern red/evening group comprises nearly 50% of all detected bat calls (Figure 5).

In 2014, higher bat detection rates continued in counties with larger percentages of forested, karst, riparian, and wetland habitats. In contrast, within the predominantly agricultural landscapes more common in northern Indiana, relatively few bat calls were detected (Figure 6). While southern counties with karst features and heavily forested habitats return the highest volumes of bat calls, these counties have also experienced the greatest declines (Figure 7).

## ACKNOWLEDGEMENTS

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**MOBILE ACOUSTIC BAT SURVEY**  
Indiana Department of Natural Resources  
*Not For Regulatory Use*



Natural Regions and Number of Completed Surveys						
Natural Region (Abbreviation)	Number of Routes	Number of Completed Surveys				
		2011	2012	2013	2014	Total
Southern Bottomlands Southern Lowlands (SBSL)	11	4	25	33	40	102
Highland Rim Shawnee Hills (HRSH)	16	10	60	63	63	196
Bluegrass (BG)	10	2	22	31	38	93
Black Swamp Central Till Plain (BSCTP)	21	2	31	69	79	181
Grand Prairie (GP)	8	0	18	19	24	61
Northern Lakes (NL)	8	0	21	17	31	69
Northwestern Morainal (NWM)	2	0	8	8	4	20
Total	76	18	185	240	279	722

Figure 1

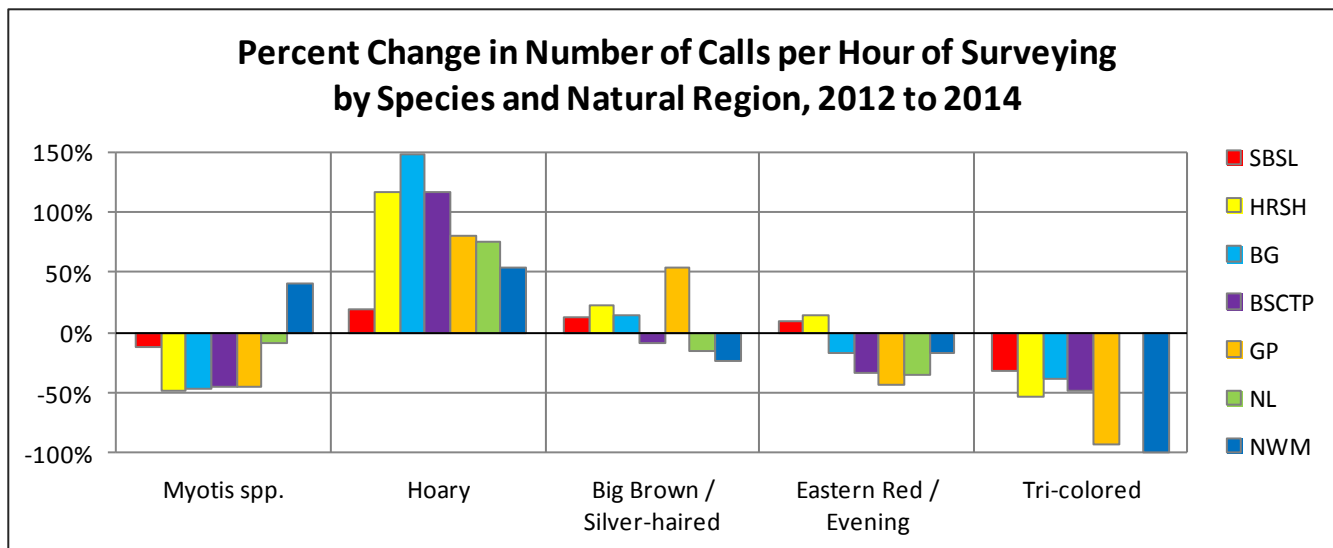


Figure 2

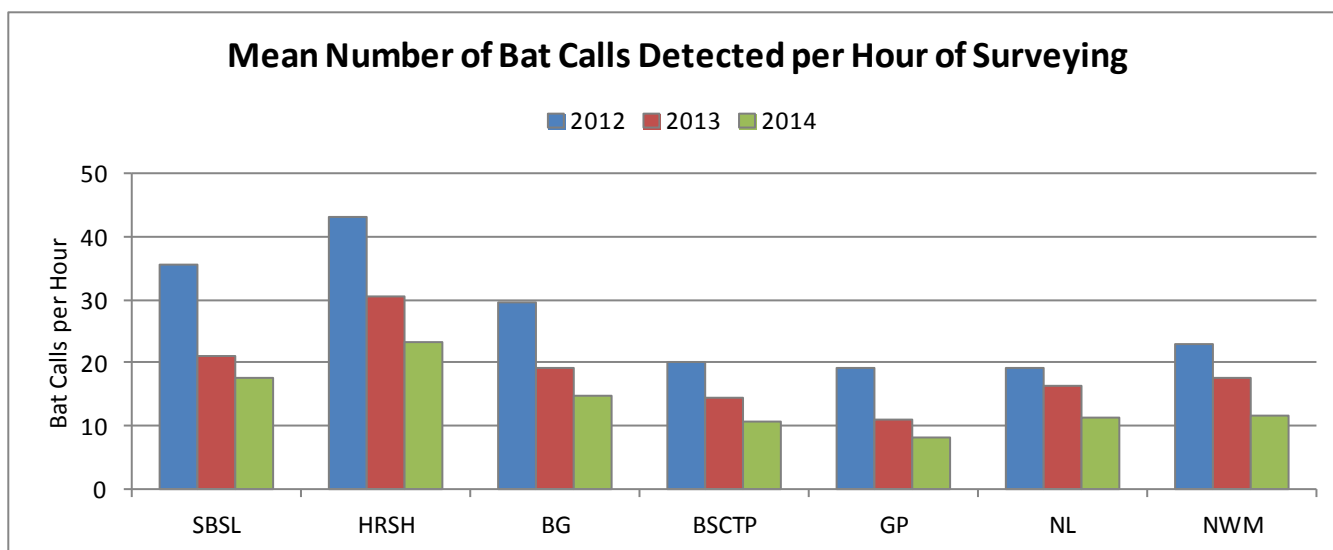


Figure 3

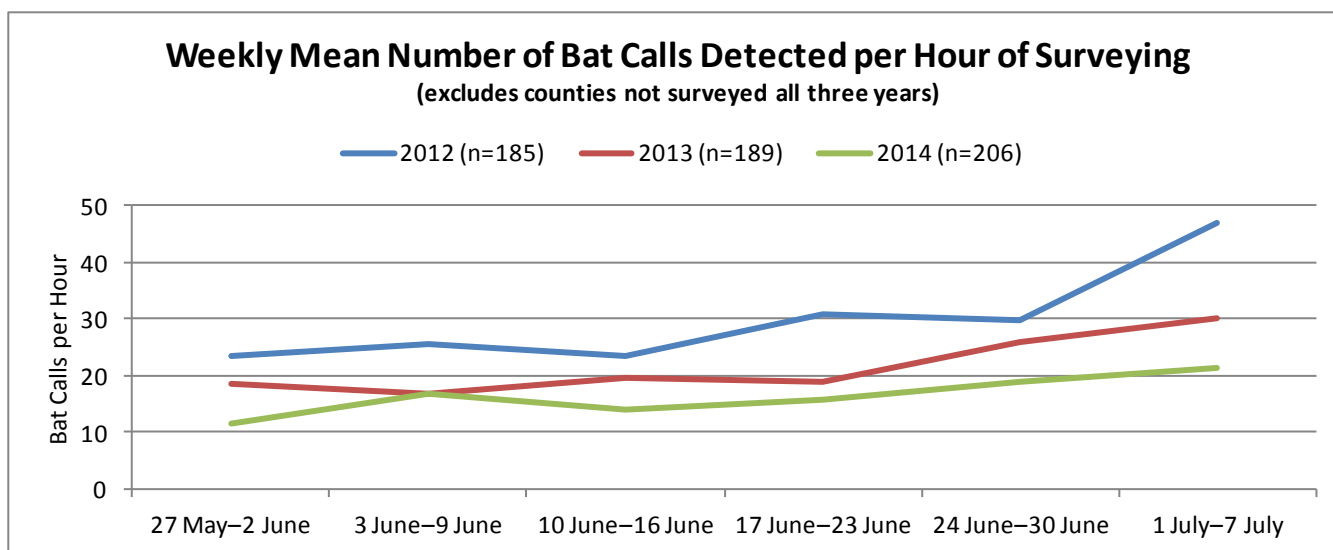


Figure 4

# **2014 Species Representation by Natural Region** (excluding unclassified calls)

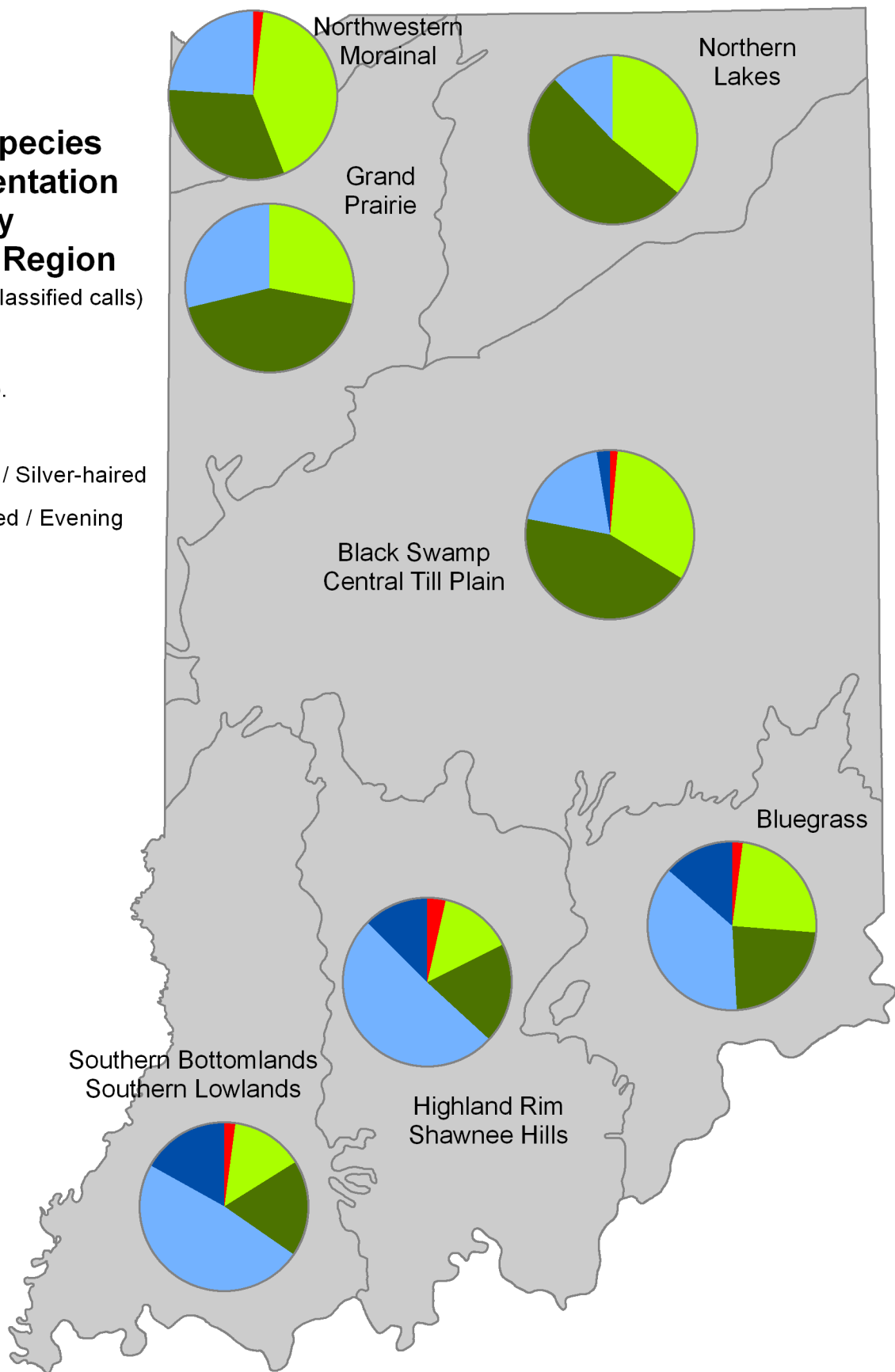
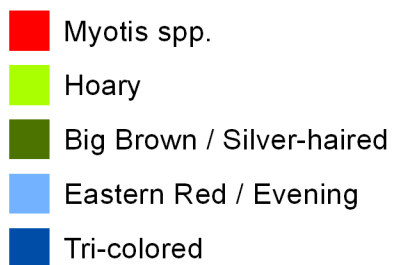


Figure 5

**2014  
Average Number  
of Bat Calls  
per Hour  
of Surveying**

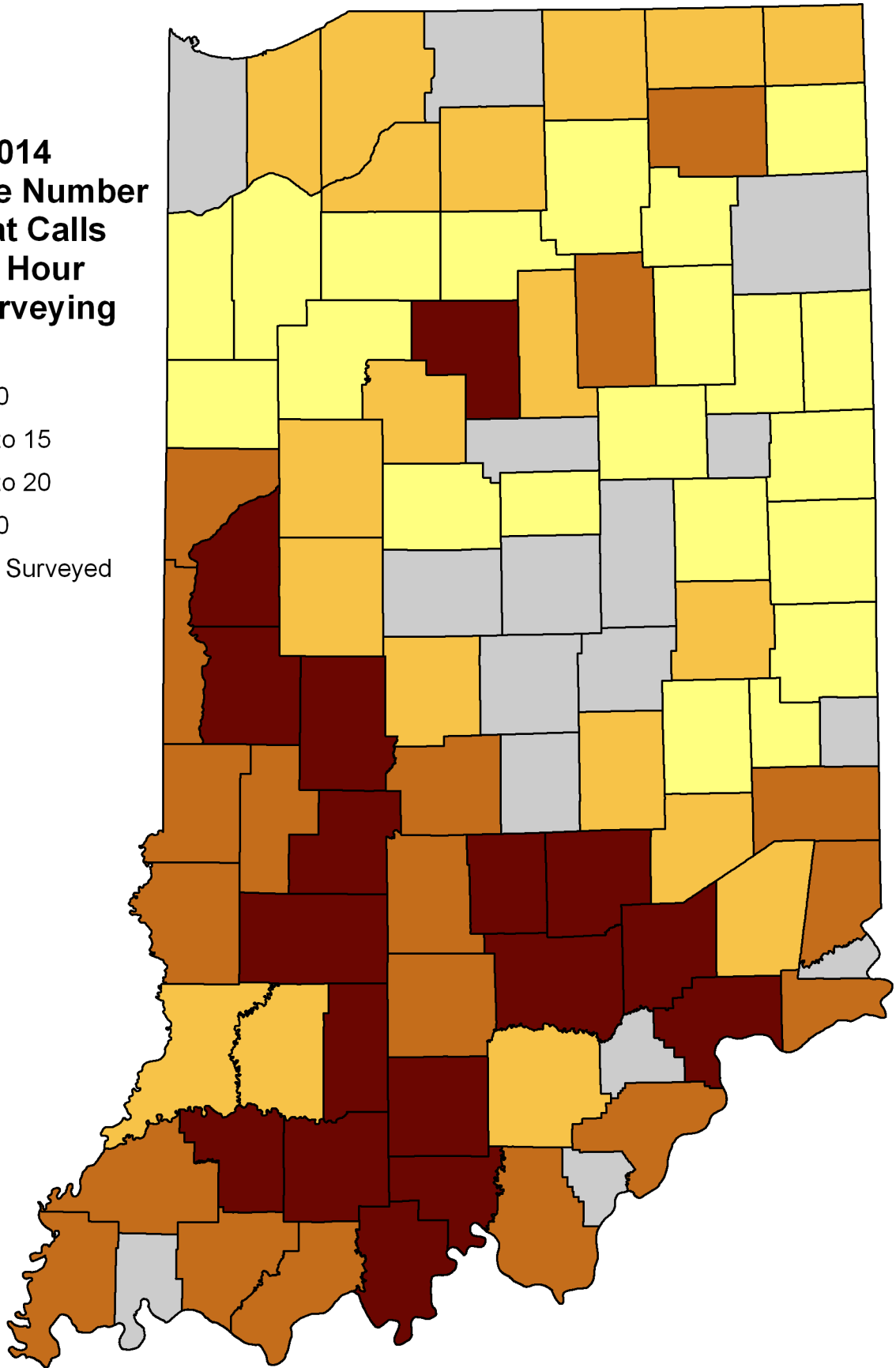
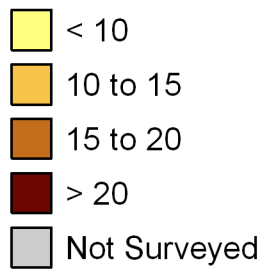


Figure 6

**Net Change in  
Average Number  
of Bat Calls per  
Hour of Surveying,  
2012 to 2014**

(excluding counties  
not surveyed all three years)

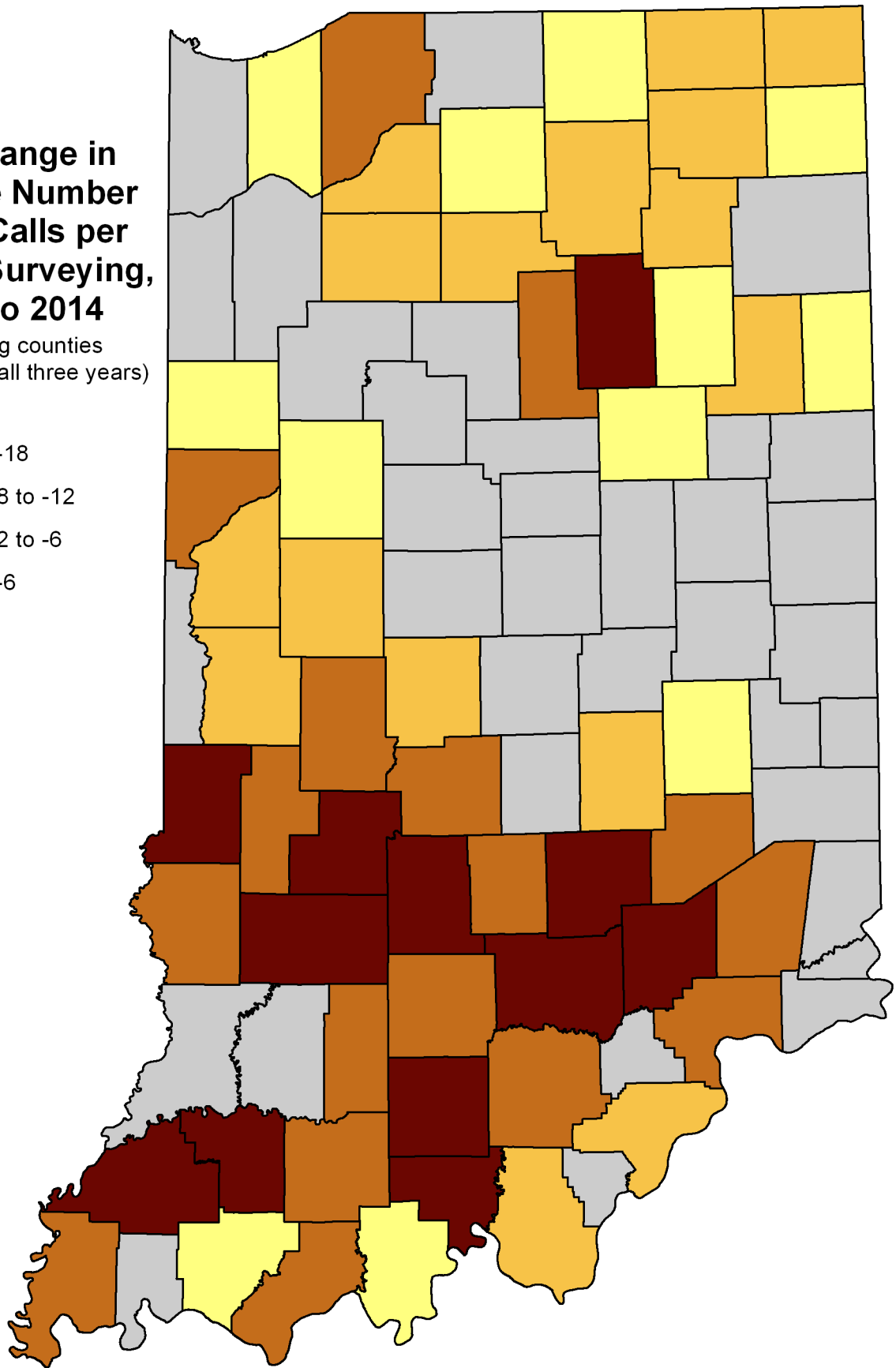


Figure 7